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Mastitis and the Practitioner*

R. W. ROACH
AGRICULTURAL ADVISORY OFFICE, BRISTOL

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II.—TREATMENT AND PREVENTION

Treatment of Mastitis

STAPHYLOCOCCAL MASTITIS.—If treatment is commenced sufficiently early there is a good chance of obtaining partial or complete recovery of the quarter. In more advanced cases treatment is aimed at bringing a toxic animal back to health. In both circumstances the pre-eminent medicant is staphylococcal toxoid. In order to reduce the danger of reaction to the injections, a series of graduated doses should be given, the usual scale being 10, 15 and 20 c.c. Practitioners report that the injections have to be given at short intervals (2-3 days) in acute cases if any success is to be obtained. In more chronic cases this interval might with advantage be increased to four to five days. Grunsell (private communication) has reported on a case that did not respond to this scale of dosage ; a sample was sent for laboratory confirmation and on a report of staphylococcus being received, he gave an injection of 30 c.c. with good clinical results. Constance (private communication) obtained a very satisfactory result from the treatment of staphylococcal mastitis with thiazamide (a proprietary brand of sulphathiazole), using a dosage scheme of 3 oz. initially, followed at eight-hourly intervals with 1 oz. doses.

SUMMER MASTITIS.—The prognosis for the quarter is hopeless, even if treatment is commenced within a few hours of the onset of symptoms. There are three lines of attack—the use of *C. pyogenes* serum, *C. pyogenes* toxoid, or sulphapyridine. There appears to be little to choose between them. All three forms of treatment prevent the infected beast from becoming toxic and successfully combat toxaemia in established cases. Thirty-three cases treated with serum all survived varying degrees of toxaemia and in a case reported by R. E. Williams, an infected quarter of a twelve-months-old heifer returned to normal. Twelve cases treated with toxoid followed a similar course, as did 15 cases treated with sulphapyridine (3 oz. initially, followed by 1 oz. t.i.d.). In connection with one animal treated with sulphapyridine the farmer reported that a second quarter had become infected the day dosing commenced and that the quarter had cleared up. We could not, of course, confirm that this was a case of *C. pyogenes* mastitis. Of some twelve cases left untreated, or which had been treated by the farmer with "quack" remedies, five died. The choice of serum or toxoid depends, I consider, on the clinical features. If the animal is acutely ill when first seen and is running a high temperature, the use of serum in fairly large doses (40 to 60 c.c.) intravenously is indicated. When the temperature subsides a little I prefer to change to toxoid (again giving graduated doses of 10, 15 and 20 c.c.). In cases of summer mastitis in which toxaemia is not marked I commence treatment with toxoid. Even if the temperature is normal I consider the injection of toxoid an essential step to prevent unfortunate sequelae. Since animals affected with *C. pyogenes* mastitis usually run very high temperatures all the usual nursing routine of fever cases is essential.

One point of controversy arises here. I have always advocated, and I believe most practitioners do, the frequent massaging and stripping of the quarter affected with acute mastitis, and yet this is in direct contradiction to the modern surgical teaching of complete rest of the affected part.

Streptococcus agalactiae MASTITIS.—Treatment depends on the state of lactation of the animal treated. Treatment is complicated by the fact that "the herd variant" of streptococcus present may respond abnormally to a particular line of therapy. The remarks given here represent the average results.

(*a*) *Lactating Cows.*—The pre-eminent drug for treating lactating animals is sulphanilamide. In order to be effective the initial dose must be large (minimum 3 oz.) to be followed every eight hours (6 a.m., 10 p.m. fit in best), by doses of 1 oz. The drug should be administered for two days after symptoms abate, but should not be continued for more than five days if no improvement is observed. Some herds harbour strains of streptococcus that do not respond to sulphanilamide, but some other causes of failure are : the omitting of the initial dose, the stopping of treatment too soon, and the giving of inadequate doses. Since Stableforth and Hignett recommended twelve-hourly doses, many practitioners have adopted this routine. But they omit to note that these authors also indicate that the 24-hourly intake should be 3 oz., so that if twice a day dosing is usual the amount given should be 1½ oz.—all doses based on the average sized cow, *e.g.*, Ayrshire.

If too small a scale of dosing is used, or if treatment is kept on for too long in a case that does not respond, there is a definite danger of a sulphanilamide resistant strain developing in the patient. The great precautions taken at one time to ensure that no source of sulphur was administered during the period of treatment now appear to have been unnecessary. In some herds cows treated with sulphanilamide scour abnormally and in such cases the use of sulphapyridine or sulphathiazole in equivalent doses is indicated.

If this treatment brings about no improvement the practitioner must "ring the changes" in the drugs at his disposal. Some practitioners have had good results with udder infusion using the acridine dyes. Acriflavine, euflavine and proflavine have all about the same effect. Although in this country we adhere fairly rigidly to the use of these dyes in solution of 1 : 10,000, the Americans use stronger solution and 1 : 6,000 and 1 : 8,000 are popular. Personally, I have never been impressed by the use of acridine dyes in lactating animals. Whilst the technique of udder infusion is too well known to need repeating, a few "tips" as regards udder infusion may be worth passing on. Do not use solutions made up too long ; avoid infusing animals during extremely cold weather ; with a lactating animal it is extremely dangerous to leave the drug in for more than five minutes, as clots will start to form which may block the teat canal and render stripping out difficult. If cows are "half-dry" the material may be left in for 15 minutes. Whatever type of apparatus one uses I feel that it is important to put on "a show." Rough and ready apparatus is likely to be copied and used by the farmer with probable disastrous results to his cattle. I dislike the use of an enema syringe because the sudden fluctuations in pressure are liable to damage the udder tissue. Personally, I usually infiltrate by gravity using the multi-purpose Vena flask developed by British Drug Houses. The Burroughs Wellcome flutter valve apparatus is extremely useful but is a little slow when large quantities have to be administered. If the udder is infused by air pressure, a bellows with a reservoir bulb should be used to create an even pressure. In this case again the Vena flask can be used, although I prefer an adaptation of the filter bottle and head manufactured by Gallenkamp. This firm produces a series of filter bottles of varying capacity. I have had a special metal filter head designed which consists of a delivery tube running to the bottom of the flask, with a short side arm for the bellows attachment. The advantage of these various types of apparatus used is that several bottles can be carried, each containing, if necessary, different types or dilutions of antiseptics.

The size of the teat needle varies; I find one of external diameter of approximately 3 mm. most suitable. Larger siphons than this may be difficult to pass and narrower needles are too sharp and may cause damage. I use siphons of the standard length (4 in. approximately), but the trend now is to use shorter needles, 2 to 2½ in.

The infusing of a quarter eight hours after the administration of a large-sized dose (4 to 6 oz.) of sulphanilamide sometimes clears up a stubborn quarter. One of the best drugs available for udder infusion to-day is sulphanilamide E.O.S. (marketed by Wellington Laboratories). This compound is soluble and a 10 per cent. solution is usually employed. Unlike the acridine dyes the material can be left in lactating udders for twelve hours without tissue damage. The present school of thought is that even in lactating animals the volume of any substance infused into a quarter should not exceed 250 to 300 c.c. I have found E.O.S. a very excellent preparation and have obtained satisfactory results in cases that have resisted other lines of treatment. As is the case with acridine dyes, the quarter treated may become slightly warm but this is nothing to worry about. Whatever type of treatment is adopted, the quarter should be stripped out several times after the end of treatment.

Apart from sulphanilamide E.O.S. the general tendency in chemotherapy is the use of small quantities of fairly high concentrations of the drug as opposed to the previous scheme of using large quantities of low dilution. The use of paraffin emulsion prevents harmful effects and probably causes a steadier spread-over of the absorption of the medicants. Thus the Americans have been giving favourable reports on the use of sulphanilamide in mineral oil suspensions. To date none of the veterinary druggists in this country is producing this

* Based on an address given to the Mid-West Division, N.V.M.A., at Bristol, July 21st, 1944.

preparation, and yet it is possible for farmers to buy this product from commercial firms. I was presented by a farmer with a bottle of 37 per cent. sulphanilamide-in-oil suspension bought "over the counter." I was not very impressed by the results, nor was Constance who used a similar preparation produced privately. I was using doses of 20 c.c. per quarter. I understand that experiments now in progress in this country in which repeated doses of 50 c.c. are given have yielded excellent results.

Sulphanilamide L.S.F. is a soluble form of the drug prepared by Burroughs Wellcome. The product is cheap and, like all the more recent preparations, the small bulk is a great advantage. L.S.F. is administered in doses of 50 c.c. (left in for twelve hours), does not appear to harm the udder, and I have had some good results in clinical mastitis cases. An American product called "Tyrothricin" is finding its way on to the English market; it is manufactured by Mulford Laboratories and distributed by Sharp and Dohme. I secured three bottles last year and from the cases I have treated I believe this to be one of the best preparations at our disposal. Doses of 20 c.c. per quarter are administered and left in for twelve hours, repeated if necessary. The preparation is a milky white fluid; it is easy to handle and is cheap. I should like to think that this preparation will be more readily available after the war. Another well-known American preparation is "Novoxil" (5 per cent. silver oxide in mineral oil). This preparation is very viscous and needs to be well shaken before use. The dosage scheme is 10 to 20 c.c. per quarter, left in for twelve hours for three days in succession. As can be imagined, the silver causes in certain cows quite severe reaction, but by the time that this subsides good results have usually become apparent. It takes a quarter a week or longer to recover from treatment, but in cases of agalactiae mastitis that have not responded to other forms of treatment "Novoxil" is worth trying.

A useful line of treatment is the use of the acriflavine emulsion formula popularised by Watts, which is:—

> *Acriflavine* one part dissolved in 49 parts of 75 per cent alcohol. 2 c.c. of this are shaken up with 18 c.c. medicinal paraffin and the 20 c.c. injected *via* the teat canal into the quarter. Strip out in twelve hours.

This preparation is easy to make and transport, and has given good results in the field. The milk is of course coloured for a few days after treatment. I have recently realised that chemists stock a ready-made paraffin emulsion, and suggest that 18 c.c. of this would produce a nicer end product than 18 c.c. of ordinary paraffin.

All these emulsified drugs are administered by the use of a teat siphon with a record fitting, attached directly on to a 50 c.c. Record syringe. Constance (Malmesbury) has shown me a 50 c.c. syringe with a wider nozzle fitting a specially designed teat needle. The apparatus is made by Arnold's and I have found it useful for the thicker types of emulsion and for sealing the teats of cows against summer mastitis (see later).

It should be emphasised here that in spite of a pile of foreign literature to the contrary, the general feeling of research workers in this country (and I endorse their views) is that the production of a bacteriological cure from cases of *Strept. agalactiae* mastitis is something of a rarity. A high percentage of clinical successes, however, is obtained by many of the preparations mentioned. Personally, I would set about tackling a clinical case in the following manner:—

Examine the cows and diagnose the type of organism. If a doubt exists, take a milk sample and send it to the laboratory. Assuming that it is a straightforward "strep." case—start off with a course of sulphanilamide. Call back in five days and if the cow has not yet responded, infuse the quarter with sulphanilamide L.S.F. or E.O.S. whilst the drug which has been administered *per os* is still being excreted in the milk. Leave without further treatment for three days. If no improvement has yet been noted resort to acriflavine emulsion or tyrothricin (*i.e.*, change treatment from sulphanilamide). Should there still be no improvement examine the udder carefully, and if there is no great fibrosis try a course of sulphanilamide-in-oil. If fibrosis is becoming marked resort to the use of "Novoxil." I expect that we shall find all these products on the market after the war.

Some of the preparations (E.O.S., L.S.F., tyrothricin) can be used with safety in the treatment of latent cases as they do not upset the milk yield excessively. As, however, the number of bacteriological cures is so small there seems little point in treating such cases in a lactating cow. I have not mentioned vaccines because it is so very difficult to get a clear picture of their value but so far as I can assess from my own and the work of others there may be some slight advantage in the use of vaccines as an adjunct to other forms of treatment.

(*b*) *Dry Cows.*—The indications for the treating of dry cows are:—

(1) Animals that have, during the previous lactation, shown signs of chronic mastitis.

(2) Animals that have been treated for acute and sub-acute mastitis during the previous lactation.

(3) Animals found by laboratory methods to be infected with *Streptococcus agalactiae.*

As is the case with the treatment of lactating cows, only a small percentage of infused animals will be cleared of infection. But the routine treatment of dry cows is a good insurance against clinical mastitis, because by such treatment a satisfactory number of clinical cures is obtained. I feel that the best method of combating sub-acute and acute cases is to keep the milk as normal as possible by the use of sulphanilamide, etc., until the animal becomes dry, and then to infuse the udder. I think it is a good policy to infuse all four quarters of the cow. The acridine dyes are best for this type of treatment and they can be left in the udder for a full 24 hours without tissue damage. I consider the optimal occasion for infusion is as soon as the animal goes dry and again a fortnight before she is due to calve. But make quite sure she is dry before leaving the material for the full day round. Again, about 1,000 c.c. per cow is adequate. The quarters are stripped out several times the day after injection.

This procedure does not appear to affect milk yield, and by virtue of clearing up clinical cases may improve the yield. It is difficult to prepare figures to prove this point because there are so many variable factors that come into play. But I have infused many dry cows that have contributed subsequently to a high herd average. Every now and then the udders of dry cows that are infused react severely. I have only encountered this once myself. On that occasion everything had been done according to "text-book" standards—reagents weighed out with laboratory precision, a sterile teat siphon for each quarter, temperature of fluid checked with a thermometer, etc. And yet all of the quarters treated of some dozen animals were rendered useless. This was during the severe winter of 1939, and I can only assume that the temperature changes were more than the udder tissue could compensate for. Practitioners have from time to time reported similar troubles; one is therefore well advised to ensure before treatment that all aseptic precautions are taken. I have heard it said too often that the antiseptic in the solution will kill off organisms in the teat siphon—a piece of wishful thinking not borne out in fact.

The Americans claim that tyrothricin is especially useful in dry cows, but the use of sulphanilamide *per os* is not of course indicated.

Miscellaneous Notes on Treatment

The practitioner has to use his discretion when consulted about sub-acute and chronic cases of streptococcal mastitis. In truly chronic cases the rate of increase of fibrosis is so slow that it is sometimes of advantage to delay treatment until the animal dries off.

"Black spot" is a difficult condition to treat. I suggest the administration of sulphanilamide *per os*, and the bathing with antiseptics of the actual sore area. In between such dressings the area should be covered with gauze and elastoplast. The quarter should be gently milked every few hours to prevent the teat from becoming occluded. Since one school of thought attributes this condition to staphylococci, a course of toxoid might be tried.

In the case of mastitis cows that are proving difficult to dry up, I suggest the following routine, which is based on the fact that it is usually about the stage of alternate day milking that the condition is most troublesome. Strip out one day and inject 20 c.c. of a 2 per cent. boric acid powder in paraffin paste into the teat canal. Strip out in two days and repeat as necessary. This usually stops the trouble and allows the cow to dry up and be infused for 24 hours.

The treatment of the "blood-in-milk" syndrome is purely symptomatic.

Prevention of Mastitis

Streptococcus agalactiae Mastitis.—It is very unfortunate, I feel, that such publicity has been given to the various types of treatment for mastitis, whilst the whole problem of prevention is seldom mentioned except in an endeavour to prove that control is impracticable. The truth concerning *Streptococcus agalactiae* mastitis is that control can and does work very efficiently. Perhaps the most striking testimony regarding this is the fact that a far greater number of requests for control come from the farmers than from the practitioners. Even in the days when farmers were paying 5s. a cow every quarter for testing, they considered it worth this expense to be clear of the disease. It was, I feel, a very ill-considered decision on the part of the Ministry to introduce a scale of compulsory charges for milk testing, especially as such charges seem to have been considered not on a basis of covering costs, but rather on accumulating a substantial profit.

There seem to be a number of popular misconceptions regarding mastitis control. The whole thing can be summed up as follows. We know that, if we carry out periodic bacteriological examination of the milk of all cows in a herd, and arrange that those animals which are excreting *Strept. agalactiae* shall be milked last, then the number of fresh cases of mastitis occurring in that herd is reduced

to a very great extent. Now we know that there are a number of weaknesses in this scheme. We know that doubt exists as to the exact role that *Strept. agalactiae* plays in chronic contagious mastitis ; debate concerning the best method of milk testing occurs wherever mastitis workers meet, and we know that there are other factors to be considered, *e.g.*, the presence of the organism on the outside of the teats and on milkers' hands. But in spite of all this, if farm managers carry out herd segregation mastitis can be controlled in the great majority of cases. But let us realise what is the goal at which we are aiming. The treatment of clinical mastitis cases in lactating cows, and of latent mastitis in dry cows, will considerably reduce the amount of clinical mastitis in a herd. But neither these measures nor the segregation of infected cows will reduce the number of infected cows. The object of mastitis control is to prevent clean cows becoming infected. With most self-contained herds there is a steady replacement of older cattle by heifers, and if these latter are protected then the percentage of clean animals gradually increases. Thus before control, one might reasonably expect some 20 per cent. of clean intakes to be infected by the end of three years ; under a control scheme this can be reduced to a 1 to 2 per cent. infection rate. The object is control and not eradication. I find that to get a badly infected herd comparatively free from trouble takes about two years. The big drawback is that one has to leave so much to the actual milkers. If they refuse to carry out the simple precautions then control attempts are futile. It is difficult for them to realise that a cow that has never shown abnormality in milk or udder, can possibly be infected.

To sum up—the same attitude should be adopted towards mastitis as is taken towards abortion, *i.e.*, the time to take steps is before the disease is rife. Practitioners who complain that the mastitis side of the Panel Scheme costs them too much are setting about the problem the wrong way. It is possible that one of the reasons for the lack of interest the profession as a whole has taken in mastitis is a fear of a drop in revenue. But similar control in the case of abortion and tuberculosis has been of mutual benefit to both practitioners and farmers.

The basic rules for mastitis control are :—

(1) All cows are tested periodically (three months is the most economic period).

(2) All cows shown to be infected are milked after the clean beasts. Clinical cases are milked last.

(3) Everything should be done to the clean animals first—washing, stripping, etc.

(4) Use a separate and distinct udder cloth for infected and clean animals and use disinfectant in the washing water.

(5) Milkers should wash their hands between stripping each cow and should disinfect the machines between each cow.

(6) All cows should be examined with a strip cup before each milking, and if there are any suspicions of mastitis in a clean cow, samples should be sent to the laboratory.

(7) Milk from fresh entries into the herd should be examined as soon as possible, such animals being milked meantime, after the known clean animals and before known infected cows.

(8) Chronic carriers revealed during routine bacteriological examinations should be treated whilst dry, and clinical cases treated as is necessary. Such treatments are, however, purely as an adjunct to control.

Concerning the above points a number of enquiries may arise. I shall be dealing with the question of machines in the next section.

It is perhaps an advantage to follow the initial test by another at a short interval, but after this the disease develops sufficiently slowly to make three-monthly testing an economic proposition. If only a small number of organisms are present and if the microscopic examination does not reveal many cells, I report such cases as light infections and suggest that such cows be milked before the cows with an established infection ; such cases frequently clear themselves of infection. If I find that a previously infected cow is now clear she has to pass three successive tests, then she is considered a safe "passed" cow.

I prefer dettol to the hypochlorites for udder washing because I find that the latter are frequently made up too strong and this chafes both the milkers' hands and the teats, making both potential streptococcal reservoirs. If the teats are very dirty the disinfectant solution should be changed frequently, or better still, the udders should first be washed with plain water and then wiped over with disinfectant. This may sound involved but by using two buckets it is easily done. One of the biggest difficulties is that even in very good cowsheds, the facilities for hand washing are frequently extremely bad. A portable washbasin stand usually overcomes this difficulty. The strip cup should be used by the most senior member of the milking staff and not by the most junior as is the case on many farms.

The rules are very simple and yet can save many hundreds of pounds a year.

The following points should also be borne in mind, as militating against successful mastitis control :—

(*a*) Hurried and inefficient milking (including bad use of machines).
(*b*) Accumulation of dirt and matted bedding in the cow stalls.
(*c*) Teat injuries and sore teats.
(*d*) Abnormally high protein in diet (causing blisters on the teats).
(*e*) Cold draughts.
(*f*) Stripping on to the byre floor.

The personal element is an ever-present feature of mastitis control ; a good milker can make or mar the scheme. We have had to abandon a number of controls because we find that the farm hands will not carry out instructions.

Staphylococcal Mastitis.—It is becoming apparent that the chronic form of this disease is sufficiently common to merit some work being done to find an economic method of control. The use of toxoid is indicated on theoretical grounds, but this product is especially difficult to prepare and is correspondingly costly. Its use on a wide scale can hardly be anticipated, therefore, until more is known of the aetiology of the disease.

Summer Mastitis.—The occurrence of summer mastitis in dry cows is intimately bound up with the prevalence of flies. When weather conditions favour a bad fly year the amount of mastitis is correspondingly high and the peak period in any part of the country corresponds with the maximum fly incidence. Farmers notice that pastures near well wooded areas are more dangerous for cattle grazing than open pastures. We do not know the role of such flies in connection with the disease, but measures taken to protect animals from flies have given satisfactory results. The simplest and easiest way of doing this is to seal the teats of all dry cows with collodion, first cleaning the teat end with spirit. Such measures give a temporary protection and should be repeated as frequently as possible, especially in wet weather. Weekly applications are essential in a bad year. This is a nuisance, especially as the young stock are often grazed a considerable distance away from a suitable compound, but farmers should be warned of the risk they are running if these measures are not undertaken.

Less frequent attention is required if the teats of dry cows are sealed by the infusion *via* the teat canal of 20 c.c. of bismuth-boracic-paraffin paste (BIPAP). This of course cannot be administered to maiden heifers. The protection in this case lasts three weeks.

It is inadvisable to carry out the routine infusion of dry cows during the period mid-July to mid-September (in S.W. England) if cows on the farm have been infected with summer mastitis that year. Such treatment tends to precipitate outbreaks of the disease.

What About Milking Machines ?

This is a problem upon which the practitioner is frequently consulted. My opinion is as follows : properly used, the milking machine has points of advantage over hand milking, but badly used it is the quickest way of ruining a milking herd. Machines have the great advantage that the teat clusters can be put on the steam chest and can be guaranteed to be sterile on removal. We know that it is practically an impossibility to sterilise milkers' hands, even if excellent washing facilities are available. It is best, however, to keep one machine unit for use on infected cows because machines are usually only sterilised once every 24 hours. This means that machines contaminated by infected cows at the end of the evening's milking, will be used on the clean ones in the morning.

A precaution worth taking is to dip the teat clusters in disinfectant between milking each cow. Three buckets should be used, one with cold water to rinse the clusters, the second contains the disinfectant, and the third again contains cold water to rinse off the disinfectant. The taps closing the milk pipe should be opened, or the cups should be well tilted to allow the disinfectant to rise in the cup. Any of the hypochlorites, or dettol, can be used for the disinfectant. If a separate unit is not kept for infected cows then teat clusters should be left in hypochlorite solution for 15 minutes after the evening milking. It has been suggested that there should be two sets of cups for each machine, one lot being left in disinfectant whilst the second is being used for milking, the sets being used on alternate cows. If farmers are prepared for this initial outlay the method has a lot to recommend it.

Concerning the use of machines, three important points should be watched for as they can cause a great deal of "non-specific" mastitis.

(1) The vacuum should not exceed at the most 15 in. and better still should be 13 in.

(2) The pulsation rate should not exceed 30 to 35 per minute, *i.e.*, 60 to 70 "clicks" per minute.

(3) The machine must be removed from the cow the moment the milk ceases to flow ; this is probably the most important rule of all.

When first introduced into a herd, machines may cause a number of latent cases of mastitis to become clinical and this may bring discredit on the machine. It will be found, however, that such cases usually settle down in the course of a few weeks. When a machine is used persistently in a wrong manner outbreaks of *Strept. dysgalactiae* mastitis will follow.

The Laboratory Aspect

Samples are sent by practitioners for three reasons. Firstly, to achieve a definite diagnosis in unusual cases, secondly to check up on their own diagnosis, and thirdly, to find out the bacteriological results of treatment. To be of any value an answer to the first type of enquiry is needed within 48 hours of sampling. This is not often forthcoming, the causes of delay being threefold. The time taken between the sampling of a quarter and receipt of the specimen by the laboratory varies very much. We hope to be able to obtain suitable packings for single sample bottles with a printed addressed label so that practitioners can post specimens immediately they are taken. But even so, postal delays are inevitable. I should like to think that future laboratories will be strategically centred along the major railway routes. The second delay is in the actual testing. Sometimes an organism will oblige by growing in pure culture very rapidly, but other organisms take much longer. *C. pyogenes*, for instance, will not show any demonstrable growth on diagnostic medium before 48 hours' incubation. By using the direct examination of incubated milk samples some rough diagnosis can be given twelve hours after the receipt of sampling, but confirmation of this result takes longer. The test is, however, sufficiently reliable to use as a basis for treatment. A quick cultural method, would, however, be a godsend. The biggest delay in the laboratory, however, is caused by the presence of contaminating organisms in the sample which necessitates repeated pickings and re-examinations. Some time ago we sent out to each practitioner in the area a supply of printed post-cards which only needed signing when a supply of sterile bottles was required. This worked well for a little while and some practitioners still make good use of this service. But we are receiving an ever-increasing number of samples submitted in all types of bottles—empty ink bottles, aspirin bottles, sauce jars still smelling of sauce, etc. If a bottle is to be sterilised by boiling then prolonged boiling (15 minutes) is required, otherwise organisms survive which rapidly grow over the surface of the medium making critical examination impossible. I would rather receive a sample from an unwashed udder than one from a washed, undried udder. The third delay occurs in reporting. Again, owing to postal delays, it may take several days between the dictating, and the receipt by the practitioner, of a report. In urgent cases, therefore, practitioners are asked to indicate that they would like an interim report by telephone.

Now what can be done to reduce all these delays? I would like to see as the equipment of every practitioner a small laboratory complete with incubator, with a central laboratory supplying the necessary media and assisting with technical instruction; also many more regional laboratories built in the centres of communication. But until this day arrives the practitioner can do much to help himself by the examination of incubated milk smears. Samples are taken into sterile bottles and kept at about 37°C. overnight—the hot water cistern cupboard does excellently for this. Next day samples are streaked on a clean slide, allowed to dry and are stained by Newman's stain* which fixes, defats and stains. After five minutes in the stain the slide is allowed to dry, and then washed and blotted dry. If the slide is marked into divisions with a grease pencil up to twelve milks can be smeared with a wire-loop on to one side. Examine under a twelfth. A few will soon tell you almost everything you want to know:—

(*a*) *The presence of cells plus long chains of palisade streptococci* indicates *Strept. pyogenes* (Group A, B, C or G), and can in most cases be taken as indicative of agalactiae. Sometimes the chains may be only moderately long (10 to 12 cocci).

(*b*) *Cells, plus short chains* (6 to 8 cocci) suggest *Strept. dysgalactiae.*

(*c*) *Long chains of streptococci without cells* being present sometimes indicate the early stages of an agalactiae infection, and sometimes mean that *Strept. uberis* is present.

(*d*) *Cells alone* mean one of three things:—

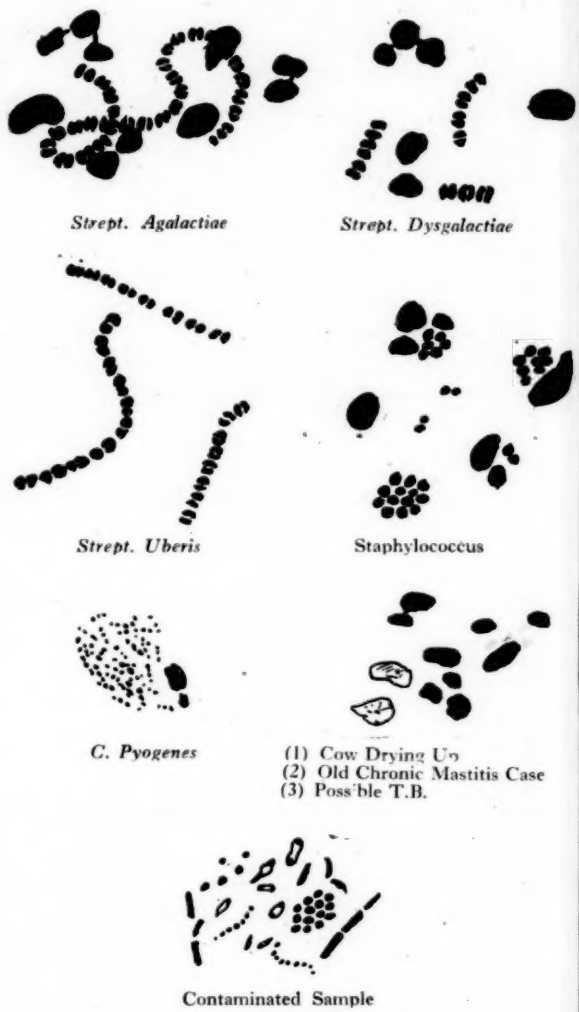
1. A normal cow that is drying up.
2. An infected cow that only intermittently excretes agalactiae—repeat examination.
3. Tuberculosis—carry out a more critical examination of the cells and if cell groups are seen do a Ziel-Neelsen.

(*e*) *Summer mastitis organisms* are thin bacilli which stain only irregularly and appear as collections of granules. These at first glance may appear to be staphylococci, and this has probably given rise to the entirely erroneous idea that staphylococci can cause summer mastitis. Cells are frequently absent in summer mastitis milk and the whole field may appear as a mass of minute beaded bacilli (the granules are of irregular size and shape and are much smaller than staphylococci).

(*f*) *Staphylococci* may be of no significance; I suggest that you disregard them unless cells are present, and if they are of pathogenic strain they will often be seen to be congregated in the unstained cytoplasm of the cells. Rapidly multiplying staphylococci often appear as diplococci.

The various pictures are summarised in Fig. 1.

Fig. 1.—Incubated Milk Smears—Typical Reactions



Mixed infections can occur, *e.g.*, dysgalactiae, agalactiae, agalactiae and staphylococci, etc. But on the whole it is better to disregard slides revealing a wide variety of organisms.

Another method of using the laboratory resources is to take advantage of this business of "herd variants." We know that the strain of streptococcus infecting any one herd differs in some respects from the strain in any other single herds. These differences cover such points as virulence, ease of spread, clinical condition produced, etc. The actual picture produced in any one herd, however, is usually constant. If, therefore, a practitioner takes careful note of the clinical picture of mastitis on any farm, and submits a sample or two from such cases to the laboratory, he can rely with a fair degree of safety on making a diagnosis on similar cases based on these earlier reports.

Public Health and Other Aspects of Mastitis

The fact that even a high percentage of mastitis (both clinical and latent) does not affect the standard clean milk tests cannot be too

* *Newman's Stain*

1 gramme Methylene blue.	40 mls. Tetrachlorethane.
54 mls. 95 per cent. Ethyl alcohol.	6 „ Glacial acetic acid.

Add tetrachlorethane to the alcohol. Heat to 70 + 0° C. on water bath. *Add* hot, to methylene blue and shake. Cool; add acetic acid slowly. Filter.

strongly emphasised. Almost every farmer who has had an adverse report immediately blames mastitis and calls in his practitioner. The trouble is usually due to poor milking routine. In such cases check up on the washing of the udder, sterilisation of milking equipments, efficient cooling, etc.

Streptococcal mastitis does not give rise to human ailments except in the most exceptional circumstances. Group A staphylococci and tubercle bacilli are the only organisms that can definitely cause human ailments. The position concerning staphylococci in the milk and their relation to human sickness has yet to be worked out. What does seem odd, however, is the fact that we know that *Br. abortus* can be excreted in the udder following abortion, that some people drinking cow milk containing *Br. abortus* will contract undulant fever, and yet we have little or no data that will allow us to assess whether mastitis due to brucella exists, and if so, what one would anticipate to be the clinical picture.

The presence of even a large number of streptococci does not affect the keeping quality of the milk and I have known milk taken from herds with a 50 per cent. latent infection rate, to keep for several days in the height of summer. Nor, as I have said, is the yield necessarily affected in mastitis cows; some of the patients I have treated as dry cows have given 4, 5, and 6 gallons daily for some period in the subsequent lactation. If a higher degree of clinical mastitis is present, then the milk may have a "salty" flavour. This is only likely to occur in badly run herds in which machines are placed on the cows without a preliminary strip cup examination. I have seen this happen more than once in herds containing several cows with clinical mastitis.

I am told by the dairy bacteriologists that the presence of large numbers of *Strept. agalactiae* in the milk adversely affects cheese making. This industry has to be very careful with regard to the milk it uses. If cows are grazed over land on which sheep have been folded the cheese produced will be tainted.

What of the Future?

The cataloguing of the main types of organisms associated with mastitis is now nearly complete. The next stage is the rather plodding job of finding out the exact role these organisms play in connection with the disease. We know, for instance, that control of *Strept. agalactiae* mastitis based on the segregation and milking last of cows harbouring these organisms, will effectively control the spread of infection in the large majority of cases.

But we know equally well that some herds have a very high percentage of latent mastitis and have little trouble with clinical mastitis, whilst in other herds almost every infected animal is a clinical case. We know that some herds are easier to clear up than others and that in herds much troubled with *Br. abortus* infection, mastitis is very difficult to combat. It has been shown on several occasions that degenerative changes occur in the udder before pathogenic organisms appear in the milk. What all this means is by no means clear. Other factors are obviously at work and one is tempted towards the "virus" theory that has been propounded in America; it would be very nice to consider all these organisms as secondary invaders.

Meantime our energies in research should be directed to finding out the simplest and quickest way of diagnosing latent mastitis so that this type of control can be placed on a nation-wide basis. If this is to be effective a far greater education of the farmer and farm worker, in matters concerning mastitis, is an essential link in the chain.

COUNCIL FOR THE PROMOTION OF FIELD STUDIES

As announced in *Nature* of December 18th, 1943, the above Council was formed as a result of the response to the suggestion of Mr. F. H. C. Butler that there was a great need for improved facilities for carrying out field studies in all subjects in which such study is an essential constituent.

In a recently-published pamphlet, copies of which may be obtained from Mr. Butler, Primrose Farm, Little Wilbraham, Cambridge, a summary is given of the aims of the Council, the ways and means by which these are to be attempted, membership (the minimum subscription is 5s.), and organisation. The offer to the Council by the National Trust of the lease of Flatford Mill, East Suffolk, as the first Field Centre, is also dealt with.

Stress is laid upon the fact that the resources of the Council will be at the disposal of all field workers, whether amateur or professional.

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Weekly Wisdom

It will be conceded by everyone that for the intelligent practice of veterinary medicine a thorough grasp of the principles of physiology is most essential. And by physiology in his connection, it is the physiology of domestic animals that is meant.—Professor M'Fadyean in a Review of Smith's "Manual of Veterinary Physiology," *J. comp. Path.*, 1895. viii. 340.

THE VETERINARY RECORD

January 20th, 1945

THE DANGER OF RABIES

THE outbreak of rabies which lasted from 1918 to 1921 was due to the illicit importation (without quarantine) of dogs from the Continent, and would probably never have occurred but for the unusual conditions prevailing at the close of a world war.

Once more we are approaching the end of a world war, and it will be seen from a leading article in the *Lancet*, reproduced elsewhere in this issue, that the spread of rabies on the Continent has probably been greater in this war than the last.

There has been little advance in the methods of control or diagnosis since 1918, but it is now known that mice are much more susceptible to the intracerebral inoculation of rabies virus than rabbits, which may give irregular results, and as Negri bodies develop in mice within five to six days and death ensues in 12 to 14 it would appear that mice may be suitable laboratory animals for diagnostic work[1].

We understand that the Animal Health Division are fully alive to the necessity for guarding against the reintroduction of rabies, but in 1918, owing to the danger of dogs being smuggled into the country during the period of demobilisation, the President of the Board of Agriculture[2] asked veterinary surgeons to be on the watch for rabies, and once again they have a special responsibility in preventing the importation of this disease. Following the evacuation from Dunkirk, practitioners were often proudly shown dogs which had been "rescued" from France, and we were indeed fortunate that an outbreak of rabies did not occur in 1941. It is also common knowledge amongst practitioners in coastal districts that many dogs were brought into the country following "D-day"; whilst this practice has been controlled to some extent there is little doubt that dogs are still being smuggled into Great Britain, and we would emphasise that it is just as important for a practitioner to report the existence of a smuggled dog as it is for him to report the existence of any one of the notifiable diseases.

Practitioners and the Animal Health Division are alive to the dangers, but it is obvious that the general public and even some responsible persons in the armed forces are not. Every effort should be taken to impress on persons travelling to and from the Continent the very real danger of introducing rabies into Great Britain, and active steps taken to prevent the smuggling of dogs. If this is not done a false sentimentalism may cause much unnecessary suffering to animals and man.

[1] Webster, L. T. "Rabies," New York, 1942.
[2] *Vet. Rec.*, 1918, **31**, 225.

HIGHLANDS AND ISLANDS VETERINARY SERVICE PLAN

Argyll County Council has recommended the Department of Agriculture to appoint a veterinary surgeon for the islands of Mull, Coll and Tiree and the Morven district following representations by the National Farmers' Union and Chamber of Agriculture of Scotland. It is stated there is a high death-rate among crofters' stock in the area owing to transport difficulties, resulting often in unavoidable delay in getting urgent treatment from the mainland. Application has been made for a veterinary centre in Mull under the Highlands and Islands Veterinary Service Plan.

CLINICAL COMMUNICATION

Fatal Poisoning in a Horse by *OENANTHE CROCATA* —The Water Dropwort

JAMES MILNE, M.R.C.V.S.,
DUNS, BERWICKSHIRE.

Subject.—A three-year-old Clydesdale Gelding.

On the morning of June 27th the animal was missing from its grazing, and was found staggering in a dazed state in the adjoining field. It was with difficulty brought into a loose-box.

Examination.—Calling at 8.30 a.m., I found the patient restless, unsteady on his legs and stumbling frequently. The visible mucous membranes were congested; the expression was fixed and staring; the pupils were fully dilated and non-responsive to light. The rectal contents were dry and scanty and the pulse was soft and slow.

A general stimulant, "Nicamide" (a proprietary preparation of nickethamide) was given hypodermically in the hope of warding off collapse and of rendering the animal sufficiently steady to permit the passage of the stomach-tube.

On returning at 9.30 a.m., it was found that maniacal symptoms had developed. Muscular control had apparently been completely regained; the head was held high and ears were couched as the animal attempted to bite and strike at anything in his way. A heavy gate partition in the building was grasped in the mouth and, oblivious to the extensive injury to the gums and palate, the horse lifted it from its hinges and later tore off the top bar. Further injury was prevented by partially enclosing the animal within piles of baled hay and administering a full dose of chloral hydrate per rectum and 4 c.c. carbamylcholine hypodermically. A few minutes later the patient sank down to a recumbent position and remained recumbent till death took place at 1 p.m.

Post-mortem examination.—This revealed the stomach to be quite full of solid material, mainly grass with a layer of crushed oats in the centre and some light coloured, woody herbage nearer the cardia, the mucous membrane being slightly inflamed in this region. The last feed of oats the animal received was at 1 p.m. on the day preceding its death.

A search was made of the field where the animal had been grazing and a suspicious-looking plant was found growing along a water-course. This was despatched to Dr. Russell Greig, of Moredun Institute, and identified as *Oenanthe crocata*—the Water Dropwort. The gelding had been noted for his habit of wading in the ditch where the plant was growing and a number of stems were found to have been recently eaten down.

It is considered that the case is worthy of record since, although *Oenanthe crocata* is regarded as one of the most poisonous plants in Britain, remarkably few cases of its having caused poisoning in the horse have been recorded. Water dropwort is a highly dangerous weed, all parts of the plant being poisonous. Since it is not widespread and is largely confined to the foot of hedgerows and about wet ditches its extermination from pastures to which stock have access is quite practicable.

VETERINARY SERVICE ACHIEVEMENTS IN THE U.S.A.

Dr. E. C. Auchter, Chief of the Agricultural Research Administration of the United States, related to the Veterinary War Conference of the American Veterinary Medical Association the achievements credited to the American veterinary services since the turn of the century and pointed out their importance to national productiveness in the course of a global war.

Brief mention was made of (1) the rigid quarantine against, and the stamping out of, foot-and-mouth disease, the presence of which among American livestock would have made appalling inroads in the world's food supply; (2) the eradication of sheep scab in the range country, the source of domestic mutton and wool; (3) the almost complete extermination of cattle-tick fever in the South and South-West, which made possible the development of a vast livestock empire, previously hindered by that disease; (4) the discovery of an effective vaccination against swine fever that enabled American farmers to raise nearly 120,000,000 head of pigs in 1943; (5) the reduction of bovine tuberculosis down to less than one-half of 1 per cent. throughout the United States after 23 years' work, which stepped up and stabilised meat and milk production; (6) the development of an effective vaccine against equine encephalomyelitis; (7) pullorum disease control on a nation-wide scale; (8) discovery of strain 19 vaccine which opened the way to the control of bovine, porcine, caprine, and human brucellosis; and (9) discovery of the anthelmintic properties of phenothiazine through which the more important worm parasitisms of livestock are being curtailed.

ABSTRACTS

[The Action of the Mechanical Milker in Relation to the Completeness of Milking and Udder Injury. PETERSEN, W. E. (1944.) *J. Dairy Sci.* **27**. 433-440.]

Two common objections to machine milking are that injury is caused to the udder and teats, thus predisposing to mastitis, and that the majority of cows will not milk out completely by machine and require to be stripped by hand. These problems have been extensively investigated by the author and the results are of great practical interest.

By a special technique, involving the use of excised as well as intact glands, the amount of suction developed inside the teat sinus and the force applied to the teat both in hand and machine milking were directly measured. Experiments showed that in machine milking no detectable vacuum is created in the teat sinus when milk flows freely from the gland sinus into the teat sinus, but as milking proceeds and the intra-gland sinus pressure falls, the tissues become more flaccid and the teat cups begin to crawl upward with each vacuum stroke, thus constricting and finally occluding the orifice between the gland sinus and teat sinus. The milk flow ceases and the vacuum in the teat sinus then becomes the same as that in the milk line and at each vacuum stroke the soft tissues at the junction of the gland and teat sinuses are forcibly compressed and pulled downward and if the cups are allowed to remain in this position considerable trauma may result. If, however, when the teat cups begin to crawl up the teats, stripping is carried out by tugging on the teat cup assembly with sufficient force to bring the cups part way down the teats, constriction and occlusion of the sinus orifice is prevented and complete evacuation of all the milk in the gland is obtained without the necessity of hand stripping. By removing the teat cups as soon as the milk flow has ceased the danger of trauma is avoided.

Measurements of the pressures applied to the teat by good hand milkers showed that pressures as great as 400 to 600 mm. Hg. were applied, whereas the force applied by the machine varied from 25 to 60 mm. Hg.

The stimulus for the "let down" of milk ought to occur about one minute before the machine is attached. [The importance of this may be realised from an experiment described elsewhere by the same author in which milking was delayed for 20 minutes after the cows had been stimulated (washing the udders). This resulted, over a two-week period, in a 16 per cent. drop in the milk production. (Petersen, W. E. Convention address, Red River Valley Dairyman's Assoc., Detroit Lakes, October 27th, 1943.)]

It is concluded that there is less risk of injury to the teats and udder from a properly operated milking machine than from a good hand milker.

A. T. C.

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[The Treatment of Vaginitis in Cows Pre- and Post-conception with Compound Silver Picrate Powder. FOLGER, G. C. (1944.) *J. Amer. vet. med. Ass.* **104**. 73-76. (1 table, 6 refs.)]

The author describes the treatment of 28 representative cases out of some 500 affected with granular or trichomonas vaginitis. He tabulates the essential case histories and shows that, although many of them had severe inflammation of the cervix and vagina and the uterus varied from normal to enlarged and inflamed, the majority quickly responded to the treatment. The treatment was applied by an insufflator (Shelanski type) to the vagina in a dose of 5 grammes of compound silver picrate powder (1 per cent. dispersion in kaolin) every other day for a maximum of three treatments.

Young heifers responded most quickly. Many cows which had returned to the bull as many as five times conceived at the next service or within two months of treatment. No pain was caused and douching was not necessary after treatment. The author stresses the importance of excluding other causes of sterility before considering vaginitis.

C. V. W.

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[I—Johne's Disease and Johnin Reactions JOHNSON, E. P., and PRATT, A. D. (1944.); **II—Studies on Johnin: (iii) Multiple Testing on Sensitised Cattle as a Method of Studying Johnin Potency.** JOHNSON, H. W. (1944), **(iv.) Dermal Thickness Gauge.** KUMMER, F. A., and JOHNSON, H. W. (1944.) *Amer. J. vet. Res.* **5**. No. 5. 117, 179, 189.]

I.—A herd of 35 Friesian cows in which there had never been clinical evidences of Johne's disease was tested with johnin and seven cows gave positive and two suspicious reactions. These cows were isolated and studied as a group. Their milk yield was satisfactory and each produced a vigorous calf which was raised to about one year of age; no calves developed symptoms of Johne's disease. Six further cows in the original herd reacted; *post-mortem* examinations on these and other animals lead the authors

MEETING REPORT

Training for the Veterinary and Medical Professions

At a meeting of the Section of Comparative Medicine of the Royal Society of Medicine on December 20th, 1944, a discussion was held on medical and veterinary education and the extent to which the two disciplines ran parallel. Dr. H. J. Parish, President of the Section, was in the chair.

The discussion was opened by Sir Henry Dale, President of the Royal Society, who disclaimed any special right to speak on the subject, saying that he was certainly not a veterinary expert, was called a medical man by courtesy, and for only a very short time in his early career did he hold a teaching post. The problems of pre-clinical education in the veterinary and in the medical professions were largely a common interest; the divergence began when it came to clinical education, though some parallelism still remained. No common course could cover the human brain and the ruminant stomach, yet much of the knowledge of the physiology of the human brain had been gained through such experiments as Sherrington had carried out on the dog and, on the other hand, knowledge concerning the physiology of respiration, applicable equally to animal and man, had been shown much better on the human subject than on any animal.

It was becoming more than ever difficult to compress into the bounds of an ordinary course the knowledge which either a medical or a veterinary practitioner was expected to acquire. One of the recent reports on medical education, that of the Royal College of Physicians, had mentioned the need for throwing over much of that which had become embodied in the curriculum. In both professions there were men who from the start, by reason of ability, opportunity, or choice, were marked out for laboratory research or for administrative work in the preventive field, while others were obviously in training with a view to applying their knowledge in day-to-day clinical practice at the bedside or at the byre. The training for these two activities must be in some ways different, otherwise both the man whose career was to be in laboratory research and he who was to take up general practice would be bogged down with an excess of non-utilisable knowledge. Such a dichotomy would logically involve a closer association, perhaps even, later on, an actual fusion in training, of those who approached an administrative career in human medicine on the one hand and in veterinary medicine on the other. He mentioned that in Australia a distinguished pathologist of veterinary training and qualification held for some years, with great success, the post of chief pathologist to one of the leading hospitals in the Commonwealth.

Sir Henry Dale went on to cite some examples of the reciprocal influence of human and of veterinary physiology and pathology. He mentioned the work of John Hunter and Edward Jenner, also of Louis Pasteur, who was neither a physician nor a veterinarian, but originally by training and natural aptitude a mineralogical chemist, and who made practical applications on the human level of the new science of bacteriology and immunology almost entirely from the study of the diseases of the lower animals. Another example was the furtherance of the knowledge of human and bovine tuberculosis as a result of the work of Robert Koch, and a much more recent example was the work of the speaker's own late colleagues Laidlaw and Dunkin on dog distemper with its effect on the study of virus diseases in general. He remembered very well in the early days how the Medical Research Council, on the advice of Sir William Leishman, decided to start an organised series of researches on the virus diseases which were then just coming above the horizon. He (Sir Henry Dale) had then urged that they should take for investigation an important animal disease which was likely to prove a virus disease, and that distemper would be a good one, first because it was an important practical disease from the point of view of animal lovers; secondly, because, being an animal disease, it could be made the subject of deliberate experiment, and, thirdly, because, if it was a virus disease which attacked the respiratory system it might assist in a wider investigation of human respiratory disease, such as influenza, suspected of a virus origin. It was a long shot, but it came off, though rather in an unexpected direction.

In conclusion, Sir Henry Dale said that once it was recognised that there was a special kind of career in experimental physiology and pathology and the study of the requirements of health and the departures leading to disease, he believed that on such a basis work on the human side and on the veterinary side would become so closely linked together that they would fuse almost inevitably into a common discipline.

Professor Pickering dealt with recent attempts to reform the medical curriculum, saying that the dilemma in medical and perhaps in veterinary education was the choice between the sacrifice on the one hand of educational and, on the other, of vocational needs of the students. The first step was to divide the curriculum into pre-graduate and post-graduate phases, assigning to the post-graduate phase the more practical training in the craft of medicine and the requirements of specialisms. Above the portal of every school should be inscribed Karl Pearson's words: "The true aim of the teacher should be to impart an appreciation of method and not a knowledge of facts," though he added that without the imparting of a certain number of facts, method itself could not be taught.

Professor J. B. Buxton (Principal, Royal Veterinary College) described the organisation of veterinary education in this country. There were five schools in the British Isles which were responsible for the training of veterinary surgeons, and there was also the Royal College of Veterinary Surgeons, with functions analogous to those of the General Medical Council except that the Council of the R.C.V.S. had sole control of the examinations which gave entitlement to practise. During the last century the field of veterinary activity had undergone profound changes with the broadening of the curriculum. The veterinary student differed in no material respect from the student for other professions in what was required of him for entrance. He had the same school background and the same tests of proficiency. The veterinary profession was, and would continue to be, a relatively small one. The balance of practitioners to demand was maintained on economically sound lines during the decade preceding the war, and for a reasonable period after the war there should be no difficulty in estimating the number of veterinary surgeons to meet the public need. The purpose of veterinary education was to train students to develop those qualities of mind and character which would fit them to enter practice as general practitioners and provide a foundation for those who wished to specialise.

It would be an improvement if the minimum age for admission to veterinary schools was 18, for the years between 16 and 18 were most valuable to the boy in his general development. The only justification for retaining the more fundamental sciences of chemistry, physics, and biology in the veterinary curriculum was to meet the need of students who had acquired a general knowledge of them at school, and, secondly, to present them with a definite bias in the direction of more advanced subjects in the curriculum. The curriculum of any profession required to be under constant examination to ensure that it was in sympathy with the ever changing functions which its members were called upon to perform.

At the present time the curriculum was in places grossly overcrowded owing to the mass of essentially factual knowledge which was transmitted to the student and which made an examination a test of memory of detail. Vigorous and careful pruning was urgently necessary in several places to check the overgrowth of detail and provide more space for the development of individual thought. Any tendency to specialise in the pre-graduate curriculum was to be deprecated. The nature and extent of the subjects taught, their relative importance, and the type of instruction to be given was to be determined by the needs of general practice.

There had for long been a feeling, Professor Buxton continued, that veterinary education was too far divorced from the universities, and that the nucleus of collaboration which had been in existence for a number of years had failed to achieve the object for which it was designed. When he undertook the principalship of the Royal Veterinary College he was not unmindful of the desirability of as close a collaboration as possible with the University of London. The College was already recognised by the University, and most of the teaching staff were recognised teachers of the University. Valuable contacts had been established between many members of the teaching staff and workers in other schools of the University interested in related problems. The Students' Union Association of the College was affiliated with that of the University. It was hoped that in this way a really effective liaison might be established between the students and staff of the College and their opposite numbers in the medical schools. Much had been achieved, but the chief impediment

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to conclude that, apart from severe intestinal infection, a very slight infection that never produces clinical disease, and "skin tuberculosis" may cause reactions to johnin. An organism resembling *M. johnei* was isolated from one of the skin lesions. Attempts to infect hamsters and cats with Johne's disease were not wholly successful although reactions to johnin occurred.

II. (iii).—It was shown that cattle could be highly sensitised to johnin by the intraperitoneal inoculation of *M. johnei* in mineral oil. All areas of the skin showed a uniform and satisfactory sensitivity and one hundred or more intradermal tests could be performed simultaneously. The double intradermal method showed no advantage over the single. With appropriate dilutions differences in potency of 50 per cent. could be detected and sensitised cattle could be used for a second test after an interval of one month.

II. (iv).—A gauge is described which permits the accurate measurement of skin thickness at a constant pressure.

J. F.

had been the small number of students who had been induced to read for the University degree. This reluctance was not on account of the extra expense, but because the student whose objective was general practice could not be induced to see the worth-whil ness of the extra labour involved.

"I do not see any prospect of development along these lines sufficient to effect a really close liaison, but the veterinary profession will not establish the full chain of vocational fraternity with medicine on the one hand and agricultural science on the other unless its links are forged in a youthful environment common to all. No other professions ar so closely connected as the medical and the veterinary, and no one will question the desirability of a closer active liaison within the framework of some educational scheme." It would not be possible, even if it were desirable, to teach medical and veterinary students in the same classes. The desired results could, however, be secured through an administrative system which enabled medical and veterinary students to make free use of the courses of instruction given to each other. By such means their usual curiosity would be awakened and their natural desire for further information stimulated.

The President read a letter which he had received from a medical student which seemed to suggest that university lectures were not always as useful as they were supposed to be, owing, to some extent at least, to the inability of the lecturer to impart instruction. Teachers should be chosen with some regard to their ability to teach, and not merely for their research status.

Dr. Douglas McClean (Lister Institute) pleaded for a greater elasticity of the curriculum as it exists at present and the planning of examinations so as to allow the students to have a wider choice of subjects.

Dr. Fred Bullock (Registrar, Royal College of Veterinary Surgeons) said that whatever faults he had heard about in connection with veterinary education were common to medical and to legal education. One thing which had been done in veterinary education, but not in medical, was to bring together the teachers and examiners on one syllabus and one curriculum, and a curriculum had been produced which was the combined work of teachers of long experience and of examiners.

Professor Edholm (Professor of Physiology, Royal Veterinary College) said that it was true that the bulk of teachers in both medical and veterinary education had not been trained as teachers. If one had a bad curriculum and a good teacher the badness of the curriculum did not matter very much. It was important to make the teaching side of academic work more attractive than it was. Teaching ability should be considered as an important qualification in making appointments, and in both these fields of education help might be required from the educational psychologist. As to the common ground of veterinary and medical education, the difficulty of teaching veterinary physiology was that there was not a sufficient mass of knowledge as there was in human physiology; there were immense gaps in the subject, and it would be to a certain extent dangerous to have a complete common ground for both classes of students.

Dr. J. T. Edwards took advantage of the presence of Sir Henry Dale to recall the fact that it was one of his famous predecessors, Sir Joseph Banks, who was President of the Royal Society in 1778, who directed the movement which founded veterinary education in this country. Dr. John Rickman suggested a "job analysis" of a practitioner's life with a view to assessing the relative importance of different subjects in the education of students. Mrs. Calver Evans, who had one son a veterinary and another a medical student, pleaded that all students should be given a wide basis of general education, and that professional education should not start before 18. Dr. E. G. White said that in veterinary medicine there should be a basic qualification with as wide a training as possible, but no more specialisation than was absolutely necessary, and when this had been gained as many people as possible should be encouraged to continue their training for a post-graduate degree.

The discussion was closed by Dr. W. R. Wooldridge, who pointed out that in veterinary education, unlike medical, there was only one standard of examination, although in actual fact the examination was held under the difficult circumstances of arduous travel interspersed with hurried *viva voce* examinations, an extended period of examination covering the five centres and the consequent grave shortage of examiners. Under such circumstances it was almost impossible for a set of examiners to maintain the same standard at every centre, particularly in view of the varying local facilities. He added that medicine had a number of comparatively poorish schools but these were not the university centres. From their variety medical science had gained much. Medicine had furthermore had the great advantage of a large number of most stimulating teachers in their university schools, and as a result the urge to progress was handed on to many medical graduates. The average man of each profession might be comparable but it would be idle to deny that if the best men in each profession were compared there was a larger proportion of stimulating teachers and research workers in medicine (including clinicians) than in the veterinary profession. The latter profession would not be able to emulate that until not only the first three years of the course was taken at the universities, but clinical medicine and surgery were given the same opportunities and facilities as the bulk of them were proposing to give to the basic sciences of the veterinary training.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Jan. 24th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington, 2 p.m.

Jan. 26th.—Annual General Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

Jan. 26th.—Annual General Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.

Feb. 1st.—Meeting of the Central Veterinary Society at the Conway Hall, Red Lion Square, W.C.1, 2 p.m.

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Vaccination for Contagious Abortion

In a recent announcement the Ministry of Agriculture states that its Calf Vaccination Scheme for dairy farmers was introduced at the beginning of December, though progress has unfortunately been handicapped by temporary difficulties over the supply of vaccine. The announcement proceeds: "Vaccine is not issued from the Ministry's Veterinary Laboratory until after it has passed certain strict tests. For two and a half years increasing quantities had been produced without any serious hitch; but just at the time when much enlarged production was needed for the new scheme, a considerable quantity had to be discarded because it did not pass the prescribed tests. Under war-time conditions replacement could not be effected quickly, and supplies are likely to remain rather short for some weeks.

"The scheme includes maiden heifers up to two months before service, as well as calves, and in order to use the present limited supplies of vaccine to the best advantage, priority will be given to bulling heifers. Any calves left unvaccinated will be dealt with as soon as supplies permit.

"The scheme does not extend to adult female stock, but when vaccine becomes more readily available dairy farmers will do well to make arrangements with their veterinary surgeons for the vaccination of adult animals. It should be borne in mind that vaccination may cause an animal to have a rise in temperature for a day or two, and in milking cows the yield may, for a time, be reduced. This does not reflect upon either the vaccine, or the way in which it was administered, for vaccination has, temporarily, a rather more disturbing effect upon some animals than upon others. To minimise any such effect, farmers are advised to house all animals for a few days after vaccination."

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VACCINATION AGAINST SWINE FEVER

We are informed that the publicity given, in last week's issue of an agricultural journal, to plans for a national scheme of vaccination against swine fever, bringing into general use a new vaccine, is unauthorised. We understand that the Ministry is doing its best to secure supplies of the vaccine at an economic price, but that, at the present stage, it is too early for a statement to be made.

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Roll of Honour

LIEUT. ROBERT NORMAN DRENNAN

We record with deep regret that Temp. (Acting) Sub-Lieut. (A.) Robert Norman Drennan, R.N.V.R., who was posted missing after the raid on the Tirpitz in April, 1944, is now presumed to have lost his life in the action. He was navigator of the plane which failed to return from the attack.

Twenty-three years of age, Sub-Lieut. Drennan was the eldest son of the late Mr. Robert Drennan, Aberdeen veterinary surgeon, and of Mrs. Drennan, to whom deep sympathy will be extended in her further bereavement.

He interrupted his studies at Aberdeen University as a civil engineer to volunteer for service with the Fleet Air Arm.

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R.C.V.S. OBITUARY

McDowall, John James, 1, Thornhill Terrace, Sunderland, Co. Durham. Graduated December 15th, 1925. Died January 5th, 1945; aged 45 years.

Mr. McDowall, who was a native of Dumfriesshire, qualified at the Royal (Dick) Veterinary College in 1925. He took up practice in Sunderland the following year. His passing at the early age of 45 years is much regretted by his colleagues and friends.

Snaith, Percival, Lynton House, Bishop Auckland, Co. Durham. Graduated December 19th, 1885. Died December 15th, 1944.

Mr. Snaith, who was a native of Darlington, qualified at the Royal (Dick) Veterinary College in 1885, and retired from practice approximately at the outbreak of the war. Mr. Snaith had a very high reputation in the area. He served the agricultural community in a most loyal and distinguished manner and his passing is much regretted.

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The Late Major R. N. Lewis, M.R.C.V.S.

A Tribute

In connection with the passing of Major Lewis, recorded in our last issue, "A.M.T." and "M.M.McM." write: "It was with very great regret that we heard of the death of Major R. N. Lewis, of Campbeltown, and we feel that we cannot let it pass without reference to his abilities as a practitioner and as a philosopher and guide to many generations of veterinary students.

"He was a Yorkshireman, and succeeded in doing what few Englishmen attempt, the building up of a fine practice in Scotland. He was held in very high esteem by all members of the community in which he worked, and it can be truly said of him that he carried the torch of professional dignity into that remote part of Scotland. He set an example which, if followed, would enhance the dignity and ability of future generations of veterinary surgeons.

"No student who applied to see practice with him was ever turned down if it were possible to have him or her, and he was never happier than when he had at least three students with him. By careful teaching he gave them a great insight into 'the art and practice.' He took a deep interest in their future careers, making proud reference to 'one of my students.'

"So R. N. Lewis passed on, having done his duty to his country and his profession."

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PERSONAL

Appointment.—Mr. Robert J. Simmons, C.B.E., M.R.C.V.S., Director of Veterinary Services, Uganda, has been appointed Director of Veterinary Services, Nigeria.

Births.—Hussey.—On January 10th, 1945, at Heathside Maternity Home, Woking, to Ruth (*née* Teverson), M.R.C.V.S., wife of Bryan F. V. Hussey, a son, Nigel.

Worden.—On January 12th, 1945, at Cambridge, to Nessie (*née* Murray), wife of Alastair N. Worden, a son (Alastair Blair).

Marriages.—Baxter—Beattie.—At Trinity Church, Greenock, on January 3rd, 1945, John Doig Baxter, M.R.C.V.S., only son of Mr. and Mrs. C. D. Baxter, Cleethorpes, Lincs., to Rhoda, only daughter of the late W. R. Beattie, jun., and of Mrs. Sheina Weir, 117, Finnart Street, Greenock.

Heatley—Fraser.—At Liberton Kirk, Edinburgh, on December 28th, 1944, by the Rev. Wm. Alexander, M.A., David Heatley, M.R.C.V.S., elder son of Mr. and Mrs. David Heatley, 34, Chesser Crescent, to Susan Graham, third daughter of Mr. and Mrs. Alexander Fraser, Howdenhall, Liberton Gardens.

Mr. Downham's Accident.—We learn with much regret that Mr. K. D. Downham, B.V.Sc., M.R.C.V.S., of Thurgarton, Nottingham, while on a visit to London was knocked down by a car and is now in a London hospital suffering from elbow fracture and serious bruises to the leg.

Our readers will be interested to learn that Mr. Arthur W. Moss, Assistant Secretary of the R.S.P.C.A., and connected with that Society for some 33 years, was awarded the M.B.E. in the New Year's Honours List.

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FOOT-AND-MOUTH DISEASE

Since the announcements made in our last issue, an order restricting the movement of animals within the area "declared infected" has been made by the Ministry of Agriculture in consequence of the confirmation of the existence of foot-and-mouth disease at the following centre: January 10th—Stocksbridge (Sheffield, Yorks. W.R.).

"THE MENACE OF RABIES"

In view of the grave importance of the subject with which it deals, as emphasised in our Editorial Columns this week, we reproduce below a leading article, headed as above, published in the issue of *The Lancet* of November 11th, 1944:—

Rabies affects primarily the canine, feline and vulpine species, but man and all the domestic animals are susceptible if bitten by a rabid animal. Aristotle described the disease in animals, and Celsus (100 B.C.) realised that the bite of a rabid dog was dangerous to man and advocated local measures similar to those still employed to reduce the probability of infection. Zinke in 1804 showed experimentally that the saliva was infective, but despite this early recognition of the method of spread the disease has seldom been eradicated or even effectively controlled when once it has gained a foothold. The United States Bureau of Animal Industry has been particularly successful in stamping out a large number of animal diseases, but during the past ten years human cases in that country have averaged 57 annually and individual states have reported a yearly average of over 1,000 proved cases in animals.[1] According to Fleming[2] rabies was first described in Great Britain about A.D. 1000, but probably existed much earlier. In the middle of the 18th century "madness raged amongst dogs in London" as well as the rest of England, and a reward of 2s. (quite a large sum in those days) was offered for the destruction of stray dogs; this led to much brutality but was ineffective in controlling the disease. In the 19th century severals packs of hounds, including the Quorn, were affected and some had to be destroyed; up to 36 persons died annually from the disease. The stringent control measures which were eventually imposed led to the eradication of rabies from the United Kingdom in 1902. For 16 years strict quarantine measures enabled the Board of Agriculture to guard against its introduction from abroad. Stockman,[3] who was Chief Veterinary Officer at the time, has described how rabies was reintroduced into Great Britain. The blame must be attached partly to the abnormal conditions then prevailing and partly to the fact that after long unfamiliarity with the disease "a section of the British public failed, or refused, to realise the gravity to man and dog of introducing rabies into a clean country." During the 1914-18 war the incidence of rabies had greatly increased on the Continent and mysterious deaths began to occur among dogs in the Plymouth district in 1918. After field and laboratory investigations the Board of Agriculture declared the disease present on September 7th, 1918. It was established that the outbreak was due to the smuggling of dogs by air. Energetic control measures were taken, and a definite diagnosis could be given by the board's veterinary laboratory within five hours of receiving material. Regulations concerning the muzzling and movement of dogs were at once applied; but they would have been less effective than they were if it had not been for several fortuitous circumstances. First, most of the dogs were affected with the dumb or paralytic form, which greatly curtailed their wanderings and their ability to bite. Secondly, Cornwall is relatively isolated from the rest of the country and most of those dogs which did run long distances took a westerly direction and came up against the sea. Yet despite these favourable circumstances 17 counties were eventually involved, 327 dogs died of rabies and 358 bitten persons were given anti-rabies treatment. *The Times* contended that the offence of smuggling dogs should be made punishable by imprisonment, because fines were ineffective. The outbreak was not finally controlled until December, 1921.[4]

Since 1941 the Germans have taken precautions against the introduction of rabid dogs from occupied countries and there can be little doubt that the spread of rabies in Europe has been even greater than it was in the last war. Unless all precautions are strictly observed there is a very real danger of introducing the disease into Great Britain again. If this is to be prevented the general public must know something of the nature of the disease.

The incubation period is usually two to four weeks, but may be six months or even longer; hence the necessity for the lengthy quarantine period. In the earliest stages of the disease the dog is moody and restless, seeking out corners in which to hide, but on occasion it may be unusually affectionate. The dog becomes more and more restless and displays fits of rage, and owing to changes in the throat there is often a characteristic bark; a rather high pitched bark is followed by five to eight decreasing howls, the jaws not being closed between each. The dog becomes aggressive whenever it sees another of its own species. After two or three days of these preliminary symptoms the animal passes into the "furious stage" and may wander long distances attacking any man or animal in its path; it attacks silently and when beaten shows no sign of feeling pain. Between paroxyms of fury the animal may be exhausted; then all at once it rouses itself again. The furious stage seldom lasts more than three or four days and gradually merges into the last period when the symptoms of paralysis appear, to be followed by death. In dumb rabies the furious stage does not develop and the dog is less dangerous; it does not bark, and the lower jaw hangs down partially paralysed. At no time during the disease does the animal display any fear of water, and it may bury its muzzle in water in a futile attempt to drink.

If rabies reappeared in Britain it would of course be necessary to make available one or other of the rabies vaccines, though their value has been questioned. Webster[1] has reviewed the results,

both clinical and experimental, of inoculating against rabies and can find no scientific evidence that vaccination after the bite of a rabid dog reduces the likelihood of the victim contracting rabies. He points out that in man one vaccine is as effective as another and a 14-day or more delay before beginning treatment does not increase rabies mortality. He admits, however, that if a person is bitten by a rabid dog and takes treatment his chances of contracting rabies are no more than 1 in 77 and probably as low as 1 in 510, and despite his scepticism these figures compare very favourably with earlier ones quoted by Fleming in 1872: of 132 persons bitten by rabid dogs who had their wounds cauterised 41 (31 per cent.) died, and of 66 persons bitten, whose wounds were not cauterised, 55 (84 per cent.) died. Even if one allows for lack of precision in diagnosis these figures are far worse than those obtained to-day and it seems either that rabies is less virulent for man than it used to be or that modern methods of treatment are effective. The importance of removing infected saliva by immediately washing an open wound or sucking a punctured wound should not be overlooked, and it is generally agreed that cauterising a wound by heat or nitric acid reduces the chances of infection.

If rabies does come again it will cause much suffering to man and animals. It need not be introduced if the general public as well as the military and civil authorities realise the dangers and insist that no false sentiment permits the regulations against smuggling dogs to be infringed. If all dogs brought into Great Britain are kept in quarantine for six months, as the law lays down, the country will remain free from rabies.

(1) Webster, L. T. Rabies, New York, 1942.
(2) Fleming, G. Rabies and Hydrophobia, London, 1872.
(3) Stockman, S. *Vet. Rec.* (1929.) **32**. 135.
(4) See *Lancet*, 1926, ii, 719.

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We learn that the importation into New Zealand of dogs from the United Kingdom is prohibited by regulation under the Stock Act as from December 7th, 1944.

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SCIENCE AND NATIONAL WELFARE

Great stress was laid at the recent conference of the British Association on the necessity that those in a position to do so should remove obstacles to research and apply the findings of science to the everyday problems of life and work.

Lord Woolton reminded the conference that we were living at a time when the men of science were making great discoveries over the wide fields of knowledge. We gave them little support in their academic pursuits and small encouragement in the wider application of their knowledge. The universities were almost divorced from the practical men of affairs, and deliberate planning to meet either the needs or the dangers of the future met with no encouragement. He insisted that the State and industry between them should spend without stint on scientific research, and should ensure that the results of research are not "left like foundlings to the tender mercies of the casual commercial passer-by."

Sir Joseph Barcroft spoke of the difficulties of directing agricultural research along the most promising channels while Britain's future policy for the production of milk, eggs, beef and other foods is unknown.

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AN ACADEMY OF MEDICINE

Contributing to correspondence in *The Times* advocating the establishment of an academy of medicine, Sir Alfred Webb-Johnson, President of the Royal College of Surgeons of England, says that the formation of such an academy is not a matter that concerns only the royal medical colleges, although the bringing together of those colleges on a common site is an essential first step towards this desirable end. "As Sir Stewart Duke-Elder points out," he continues, "an authoritative academic medical body is needed in the public interest. The project therefore concerns the public and the whole medical profession. It has already aroused public interest, and there is reason to expect that it will attract considerable public support.

"For some years the Council of the Royal College of Surgeons has had in mind the desirability of the formation of an academy of medicine, and, in order to provide an opportunity for such a project, acquired sites in Lincoln's Inn Fields which are adequate for the requirements of all the royal medical colleges and specialist associations. The Council's action was made known in a memorandum published over a year ago, and was approved by general meetings of fellows and members of the College. Since the publication of that memorandum further acquisitions of property have been made, and the sites now available provide ample space for immediate needs and future developments. The Council favours the Lincoln's Inn Fields site for this project because of its advantages and amenities. Lincoln's Inn Fields is the largest square in London. It is a quiet area, and has an academic, collegiate atmosphere, which was created and has been preserved by the Honourable Society of Lincoln's Inn. The situation is central and accessible, and is known throughout the world as the site of the famous Hunterian Museum.

"In the planning of a medical academic centre the Royal College of Surgeons is prepared to assign to the use of either of the other colleges any existing part of its present buildings in exchange for equivalent accommodation on some other part of the site. The college is also prepared to put to common use its existing and restored facilities, such as conference rooms, museums, laboratories and library. It is a matter of some urgency for a decision to be made because the Council wishes so to plan the restoration of the Royal College of Surgeons as to make the accommodation suitable for the use of all the medical bodies which would naturally take part in the formation of an academy of medicine. It is the hope of the Council that the royal medical colleges will be brought together on a common site, and thus form the nucleus of a medical academic centre worthy of the heart of the Empire and the high traditions of British medicine."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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SULPHADIAZINE IN THE TREATMENT OF UNDULANT FEVER

A Personal Experience

Sir,—I feel that my recent experience in sulphadiazine chemotherapy in the treatment of undulant fever may be of interest to a profession in which this condition is, unavoidably, comparatively common.

After suffering for some five weeks, I happened to come across the abstract (*Vet. Rec.*, October 21st, 1944) of H. L. Gilman's communication in the *Cornell Veterinarian*, 34. Consequently, although two separate medical practitioners had assured me that treatment with any of the sulphonamide series of drugs was of no avail in the treatment of undulant fever, sulphadiazine was tried, with, in my opinion, a thoroughly successful result.

The following temperatures, all taken at 7 p.m., are indicative: Monday, 101·2; Tuesday, 100·8; Wednesday, 101; Thursday, 98·8; Friday, 98·6; Saturday, 98·6. Therapy was commenced at 8 p.m. on the Tuesday and continued until 12 noon on the Friday (one gramme at four-hourly intervals). The average temperature at the same time for the previous week had been 101·5°.

Symptoms were identical with those described by Gilman. No blood culture was made, but an agglutination test (the only one) on about the twentieth day gave a titre of 1:1,280.

I feel that an interesting point is that exposure to infection, in the form of a series of cleansings performed on aborted cows, must have taken place during the last fortnight in September, *i.e.*, at least one clear month before the first appearance of symptoms, during the first week in November. This may be compared with the 16-day incubation period of Gilman's subject, where the infection per conjunctiva was more direct than through the skin as in this case.

Thus, although I am fully aware that many would say that the temperature would have subsided to normal, and the symptoms have disappeared, in any case, I feel that sulphadiazine may indeed have its place in the treatment of naturally acquired abortus fever in the human subject.

Yours faithfully,
E. R. Cook
(Final Year, R.V.C.)

Hillmere, Park Avenue South,
Northampton.
December 30th, 1944.

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NICOTINE AND COPPER SULPHATE FOR LAMBS

Sir,—I would like to thank Mr. Crawshaw (*Vet. Rec.* **56**. 507) for so kindly pointing out to me that my figures are not correct as regards the number of grains in my dose of copper sulphate and nicotine sulphate.

Yours faithfully,
Graham Rees-Mogg.

Clifford Manor, Stratford-on-Avon.
January 12th, 1945.

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A NON(?)-POLITICAL REFLECTION

Sir,—I note, not without amusement, that if someone of like mind with oneself succeeds to office, it is "non-political"; if of opposing views, the appointment at once becomes "political."

Yours faithfully,
Paul Crosfield.

Chipping Norton.
January 9th, 1945.